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Napa County, California

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NATIONAL EUTROPHICATION SURVEY

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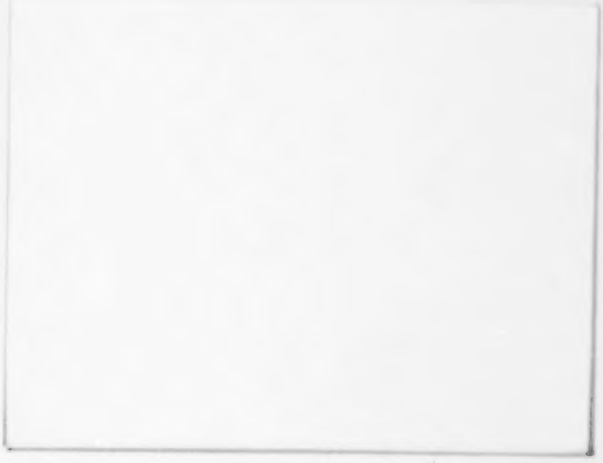

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT
ON
LAKE HENNESSEY
NAPA COUNTY
CALIFORNIA

EPA REGION IX

WORKING PAPER No. 747

WITH THE COOPERATION OF THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

AND THE

CALIFORNIA NATIONAL GUARD

JUNE, 1978

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentration (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGEMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the California State Water Resources Control Board and the nine Regional Water Quality Control Boards for professional involvement, to the California National Guard for conducting the tributary sampling phase of the Survey, and to those California wastewater treatment plant operators who voluntarily provided effluent samples and flow data.

The staff of the Division of Planning and Research of the State Water Resources Control Board provided invaluable lake documentation and counsel during the Survey, coordinated the reviews of the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

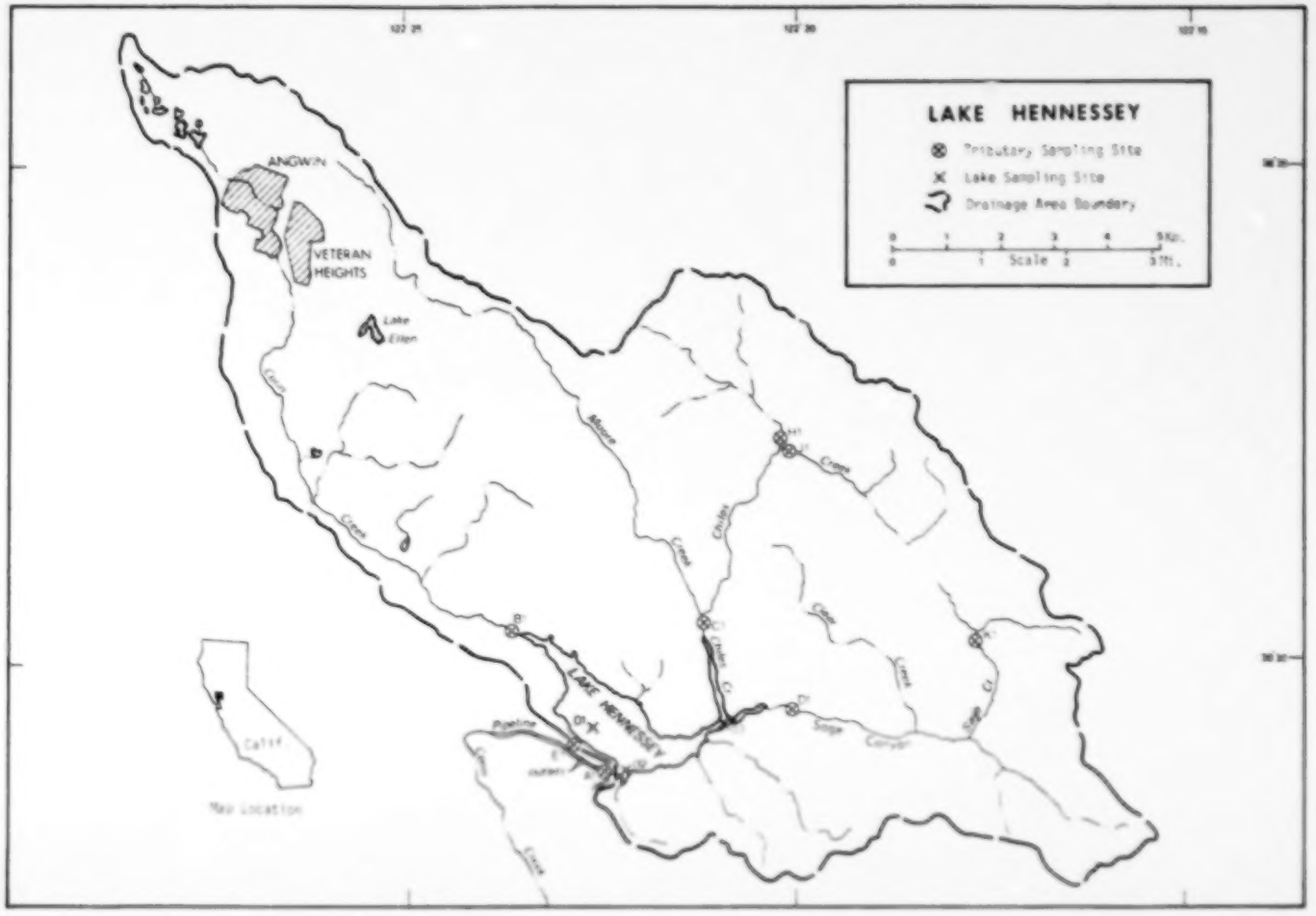
Major General Glen C. Ames, the Adjutant General of California, and Project Officer Second Lieutenant Terry L. Barrie, who directed the volunteer efforts of the California National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY RESERVOIRS

State of California

Name	County
Amador	Amador
Boca	Nevada
Britton	Shasta
Casitas	Ventura
Crowley	Mono
Don Pedro	Tuolumne
Elsinore	Riverside
Fallen Leaf	El Dorado
Hennessey	Napa
Henshaw	San Diego
Iron Gate	Siskiyou
Lopez	San Luis Obispo
Mary	Mono
Mendocino	Mendocino
Nicasio	Marin
Lower Otay	San Diego
Pillsbury	Lake
Santa Margarita	San Luis Obispo
Shasta	Shasta
Shaver	Fresno
Silver	Mono
Tahoe	El Dorado, Placer, CA; Carson City, Douglas, Washoe, NV
Tulloch	Calaveras, Tuolumne
Lower Twin	Mono
Upper Twin	Mono


LAKE HENNESSEY
Tributary Sampling Site
Lake Sampling Site
Drainage Area Boundary
0 1 2 3 4 5Km.
0 1 Scale 2 3Mi.
ANGWIN
VETERAN HEIGHTS
Lake Ellen
Conn Creek
Milliken Creek
Redwood Creek
Ellen Cr.
Simmons Cr.
LAKE HENNESSEY
Napa River
Calif.
Map Location

LAKE HENNESSEY

STORET NO. 0609

I. CONCLUSIONS

A. Trophic Condition*:

Survey data indicate that Lake Hennessey is eutrophic. It ranked fifteenth in overall trophic quality when the 24 California lakes and reservoirs sampled in 1975 were compared using a combination of six parameters**. Twelve of the waterbodies had less median total phosphorus, nine had less and five had the same median inorganic nitrogen, eleven had less median dissolved orthophosphorus, eleven had less mean chlorophyll a, and 14 had greater mean Secchi disc transparency. Significant depression of dissolved oxygen with depth occurred at all three sampling stations in June, and depletion occurred at station 1 in November.

Survey limnologists did not observe surface concentrations of algae, but noted emergent macrophytes along much of the shoreline in June. However, it is reported that a copper formulation, Cutrine, is applied periodically to control problem growths of algae (Bailey, 1977).

B. Rate-Limiting Nutrient:

The results of the algal assay indicate nitrogen limitation in November. The reservoir data indicate nitrogen limitation all three sampling times.

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* Trophic assessment is based on levels of nutrients, dissolved oxygen, and chlorophyll a; phytoplankton kinds and numbers; and transparency (Allum et al., 1977).

** See Appendix A.

C. Nutrient Controllability:

1. Point sources--No municipal wastewater treatment plants are known to have impacted Lake Hennessey during the sampling year, although the Angwin facilities may have contributed to the phosphorus load (see discussion below).

The present phosphorus loading of 1.46 $g/m^2/yr$ is more than twice that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 12), and every effort should be made to minimize the input of phosphorus to slow the aging of the reservoir.

2. Non-point sources--Non-point sources, including direct precipitation, apparently contributed all of the total phosphorus load to the lake during the sampling year. Conn Creek added 68.5% of the total phosphorus load; Chiles Creek, 7.4%; Clear Creek, 10.4%; and the ungaged tributaries contributed an estimated 12.5%.

The phosphorus export rates of Conn Creek, Chiles Creek, and Clear Creek were 106, 8, and 15 $kg/km^2/yr$, respectively (see page 11).

The export rate of Conn Creek was very high compared to the other tributaries and may be due to point source impact. The community of Angwin is served by a series of stabilization ponds that normally do not overflow to Conn Creek (Kramer, 1976). However, precipitation and flow data indicate higher than normal runoff during the sampling year, and it appears likely that some overflow from the Angwin ponds to Conn Creek did occur.

II. RESERVOIR AND DRAINAGE BASIN CHARACTERISTICS†

A. Morphometry††:

1. Surface area: 3.52 kilometers^2.
2. Mean depth: 10.5 meters.
3. Maximum depth: 25.9 meters.
4. Volume: 37.005 x 10^6 m^3.
5. Mean hydraulic retention time: 1 year (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Conn Creek	33.4	0.483
Chiles Creek	47.1	0.266
Clear Creek	35.5	0.354
Minor tributaries & immediate drainage -	15.2	0.250
Totals	131.2	1.353

2. Outlet -

Napa Water Intake	134.7**	1.183**

C. Precipitation***:

1. Year of sampling: 84.3 centimeters.
2. Mean annual: 77.6 centimeters.

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† Table of metric equivalents--Appendix B.
†† Dendy, 1974.
* For limits of accuracy, see Working Paper No. 175, "... Survey Methods, 1973-1976".
** Includes area of reservoir; outlet flow adjusted to equal sum of inflows minus evaporation.
*** See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Lake Hennessey was sampled three times in 1975 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at two stations in March and three stations in June and November (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the last visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll *a* analysis. The maximum depths sampled were 26.2 meters at station 1, 13.1 meters at station 2, and 8.5 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE HENNESSEY
STORET CODE 0609

PARAMETER	1ST SAMPLING (3/13/75) 2 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (6/26/75) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/11/75) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	8.6 - 11.2	10.0	10.6	9.9 - 20.4	16.7	19.7	13.6 - 16.3	15.8	16.1
DISS OXY (MG/L)	7.4 - 11.0	9.5	10.1	1.2 - 8.4	5.0	5.0	0.0 - 8.8	7.2	8.3
CNDCTVY (MCHOMO)	187. - 197.	192.	193.	195. - 275.	241.	260.	237. - 265.	257.	259.
PH (STAND UNITS)	7.8 - 8.5	8.1	8.1	7.5 - 8.8	8.2	8.3	7.4 - 8.2	8.0	8.1
TOT ALK (MG/L)	113. - 130.	120.	118.	121. - 141.	131.	132.	131. - 147.	139.	139.
TOT P (MG/L)	0.034 - 0.047	0.040	0.041	0.014 - 0.046	0.025	0.022	0.020 - 0.370	0.054	0.024
ORTHO P (MG/L)	0.007 - 0.027	0.015	0.011	0.003 - 0.027	0.009	0.005	0.009 - 0.146	0.028	0.015
NO2+NO3 (MG/L)	0.020 - 0.180	0.087	0.055	0.020 - 0.270	0.094	0.025	0.020 - 0.030	0.021	0.020
AMMONIA (MG/L)	0.020 - 0.050	0.031	0.020	0.020 - 0.040	0.026	0.020	0.020 - 0.300	0.057	0.020
KJEL N (MG/L)	0.200 - 0.600	0.300	0.200	0.300 - 0.500	0.344	0.300	0.200 - 0.600	0.264	0.200
INORG N (MG/L)	0.040 - 0.230	0.117	0.075	0.040 - 0.310	0.119	0.060	0.040 - 0.320	0.077	0.040
TOTAL N (MG/L)	0.240 - 0.640	0.395	0.370	0.320 - 0.610	0.437	0.435	0.220 - 0.620	0.285	0.220
CHLRPYL A (UG/L)	3.0 - 6.1	4.5	4.5	2.6 - 4.1	3.3	3.1	4.6 - 6.8	5.8	5.9
SECCHI (METERS)	0.6 - 0.6	0.6	0.6	1.2 - 2.9	2.2	2.6	2.7 - 3.4	3.0	3.0

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/13/75	1. Chroomonas (?) sp.	2,039
	2. Asterionella sp.	105
	3. Stephanodiscus sp.	35
	4. Synedra sp.	18
	5. Cryptomonas sp.	18
	Other genera	18
	Total	2,233
06/26/75	1. Gloeocystis sp.	780
	2. Aphanizomenon sp.	654
	3. Chroomonas (?) sp.	503
	4. Melosira sp.	151
	5. Coelastrum sp.	101
	Other genera	328
	Total	2,517
11/11/75	1. Closterium sp.	262
	2. Aphanizomenon sp.	75
	3. Cryptomonas sp.	37
	4. Chroomonas (?) sp.	37
	5. Ankistrodesmus sp.	37
	Total	448

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
03/13/75	1	6.1
	2	3.0
	3	-
06/26/75	1	2.6
	2	3.1
	3	4.1
11/11/75	1	6.8
	2	4.6
	3	5.9

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.065	0.065	5.4
0.050 P	0.115	0.065	5.7
0.050 P + 1.0 N	0.115	1.065	9.9
1.0 N	0.065	1.065	7.1

2. Discussion -

The control yield of the assay alga, *Selenastrum capricornutum*, indicates that the potential primary productivity of Lake Hennessey was high at the time the sample was taken (11/11/75). Also, the significant increase in yield when nitrogen was added alone, and the lack of response when only phosphorus was added, indicate nitrogen limitation at that time.

The reservoir data indicate nitrogen limitation all three sampling times. The mean inorganic nitrogen to ortho-phosphorus ratios were 8 to 1 in March, 13 to 1 in June, and 3 to 1 in November.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the California National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff month of March when two samples were collected. Sampling was begun in November, 1974, and was completed in October, 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the California District Office of the U.S. Geological Survey for the tributary sites nearest the reservoir.

In this report, nutrient loads for sampled tributaries were calculated using mean annual concentrations and mean annual flows. Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the mean concentrations in Sage Creek at station K-1 and the mean annual ZZ flow.

No wastewater treatment plants are known to have impacted Lake Hennessey during the sampling year.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Angwin	2,690**	stab. ponds	?	no discharge

2. Known industrial - None

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (non-point load) -		
Conn Creek	3,535	68.5
Chiles Creek	380	7.4
Clear Creek	535	10.4
b. Minor tributaries & immediate drainage (non-point load) -	645	12.5
c. Known municipal STP's -		
Angwin	?	-
d. Septic tanks - None	-	-
e. Known industrial - None	-	-
f. Direct precipitation*** -	60	1.2
Total	5,155	100.0

2. Outputs -

Reservoir outlet - Napa Water Intake 7,760

3. Net annual P loss - 2,605 kg.

* Kramer, 1976.
** 1970 census.
*** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Conn Creek	20,180	32.8
Chiles Creek	10,395	16.8
Clear Creek	13,105	21.2
b. Minor tributaries & immediate drainage (non-point load) -	14,215	23.0
c. Known municipal STP's -		
Angwin	?	-
d. Septic tanks - None	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	3,800	6.2
Total	61,695	100.0

2. Outputs -

Reservoir outlet - Napa Water Intake 39,955

3. Net annual N accumulation - 21,740 kg.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Conn Creek	106	604
Chiles Creek	8	221
Clear Creek	15	369

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P Conc. (mg/l)	Mean Total N Conc. (mg/l)
Unnamed Creek H-1	0.054	1.587
Sage Creek	0.082	1.803

* See Working Paper No. 175.

F. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	1.46	loss*	17.5	6.2

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Lake Hennessey:	
"Dangerous" (eutrophic loading)	0.62
"Permissible" (oligotrophic loading)	0.31

* There was an apparent loss of phosphorus during the sampling. This may have been due to point sources discharging directly to the reservoir, solubilization of previously sedimented phosphorus, or recharge with phosphorus-rich groundwater.

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO HE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	SOO-MEAN SEC	MEAN CHLOPA	15-MIN DO	MEDIAN DISS ORTHO P
0601	AMADOR RESERVOIR	0.040	0.390	408.667	22.383	14.600	0.020
0602	BOCA LAKE	0.012	0.040	372.833	1.700	6.800	0.003
0603	LAKE BRITTON	0.067	0.115	448.500	4.811	11.200	0.047
0604	CASITAS RESERVOIR	0.029	0.050	400.250	3.192	14.000	0.014
0605	CROWLEY LAKE	0.044	0.045	374.750	5.800	12.200	0.034
0606	DON PEDRO RESERVOIR	0.013	0.060	381.733	3.594	11.400	0.004
0607	LAKE ELSINORE	0.469	0.120	489.214	70.572	8.000	0.092
0608	FALLEN LEAF RESERVOIR	0.007	0.040	24.357	0.786	8.800	0.005
0609	LAKE HENNESSEY	0.027	0.060	416.000	4.525	15.000	0.012
0610	LAKE HENSHAW	0.138	0.070	461.000	26.783	9.800	0.073
0611	IRON GATE RESERVOIR	0.184	0.690	440.333	6.217	13.800	0.124
0614	LOPEZ LAKE	0.371	0.090	372.000	8.658	15.000	0.343
0615	LAKE MARY	0.010	0.040	296.000	2.550	10.600	0.002
0616	LAKE MENDOCINO	0.020	0.050	436.500	3.100	9.400	0.008
0617	NICASIO RESERVOIR	0.055	0.345	482.778	6.633	9.800	0.013
0618	LOWER OTAY RESERVOIR	0.058	0.180	447.250	15.933	15.000	0.013
0619	LAKE PILLSBURY	0.022	0.060	466.667	6.389	8.200	0.008
0620	SANTA MARGARITA LAKE	0.037	0.070	400.000	9.122	14.800	0.014
0621	SHASTA LAKE	0.021	0.060	381.542	4.087	9.000	0.015
0622	SHAVER	0.014	0.060	346.400	1.700	7.400	0.004
0623	SILVER LAKE	0.012	0.055	356.000	1.800	7.000	0.003
0624	TULLOCK RESERVOIR	0.025	0.060	433.000	13.878	7.400	0.009
0625	UPPER TWIN LAKES	0.015	0.040	300.200	3.340	7.400	0.004
0626	LOWER TWIN LAKES	0.014	0.040	248.000	2.900	11.400	0.003

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NU
0601	AMADOR RESERVOIR	35 (8)	4 (1)	43 (10)	9 (2)	17 (4)	26 (6)	134
0602	BOCA LAKE	89 (20)	98 (22)	70 (16)	91 (21)	100 (23)	91 (20)	539
0603	LAKE BRITTON	17 (4)	22 (5)	17 (4)	48 (11)	43 (10)	17 (4)	164
0604	CASITAS RESERVOIR	43 (10)	74 (17)	48 (11)	70 (16)	22 (5)	37 (8)	294
0605	CROWLEY LAKE	30 (7)	78 (18)	65 (15)	43 (10)	30 (7)	22 (5)	268
0606	DON PEDRO RESERVOIR	83 (19)	54 (11)	57 (13)	61 (14)	37 (8)	78 (17)	370
0607	LAKE ELSINORE	0 (0)	17 (4)	0 (0)	0 (0)	78 (18)	9 (2)	104
0608	FALLEN LEAF RESERVOIR	100 (23)	87 (19)	100 (23)	100 (23)	70 (16)	70 (16)	527
0609	LAKE HENNESSEY	48 (11)	54 (11)	39 (9)	52 (12)	4 (0)	52 (12)	249
0610	LAKE HENSHAW	13 (3)	33 (7)	13 (3)	4 (1)	54 (12)	13 (3)	130
0611	IRON GATE RESERVOIR	9 (2)	0 (0)	26 (6)	39 (9)	26 (6)	4 (1)	104
0614	LOPEZ LAKE	4 (1)	26 (6)	74 (17)	26 (6)	4 (0)	0 (0)	134
0615	LAKE MARY	96 (22)	87 (19)	91 (21)	83 (19)	48 (11)	100 (23)	505
0616	LAKE MENDOCINO	65 (15)	70 (16)	30 (7)	74 (17)	61 (14)	63 (14)	363
0617	NICASIO RESERVOIR	26 (6)	9 (2)	4 (1)	30 (7)	54 (12)	46 (10)	169
0618	LOWER OTAY RESERVOIR	22 (5)	13 (3)	22 (5)	13 (3)	4 (0)	46 (10)	120
0619	LAKE PILLSBURY	57 (13)	41 (9)	9 (2)	35 (8)	74 (17)	63 (14)	279
0620	SANTA MARGARITA LAKE	39 (9)	33 (7)	52 (12)	22 (5)	13 (3)	37 (8)	196
0621	SHASTA LAKE	61 (14)	54 (11)	61 (14)	57 (13)	65 (15)	30 (7)	328
0622	SHAVER	78 (18)	41 (9)	83 (19)	96 (22)	87 (19)	78 (17)	463
0623	SILVER LAKE	89 (20)	65 (15)	78 (18)	87 (20)	96 (22)	91 (20)	506
0624	TULLOCH RESERVOIR	52 (12)	54 (11)	35 (8)	17 (4)	87 (19)	57 (13)	302
0625	UPPER TWIN LAKES	70 (16)	98 (22)	87 (20)	65 (15)	87 (19)	78 (17)	485
0626	LOWER TWIN LAKES	74 (17)	87 (19)	96 (22)	78 (18)	37 (8)	91 (20)	463

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	0602	BUCA LAKE	539
2	0608	FALLEN LEAF RESERVOIR	527
3	0623	SILVER LAKE	506
4	0615	LAKE MARY	505
5	0625	UPPER TWIN LAKES	485
6	0626	LOWER TWIN LAKES	463
7	0622	SHAVER	463
8	0606	DON PEDRO RESERVOIR	370
9	0616	LAKE MENDOCINO	363
10	0621	SHASTA LAKE	328
11	0624	TULLOCK RESERVOIR	302
12	0604	CASITAS RESERVOIR	294
13	0619	LAKE PILLSBURY	279
14	0605	CROWLEY LAKE	268
15	0609	LAKE HENNESSEY	249
16	0620	SANTA MARGARITA LAKE	196
17	0617	NICASIO RESERVOIR	169
18	0603	LAKE BRITTON	164
19	0614	LOPEZ LAKE	134
20	0601	AMADOR RESERVOIR	134
21	0610	LAKE HENSHAW	130
22	0618	LOWER OTAY RESERVOIR	120
23	0607	LAKE ELSINORE	104
24	0611	IRON GATE RESERVOIR	104

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 - cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

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TRIBUTARY FLOW INFORMATION FOR CALIFORNIA 09/24/76

LAKE CODE 0609 LAKE HENNESSEY

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 134.7

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
0609A1	134.7	0.102	0.096	0.113	0.210	0.368	0.416	0.445	0.425	0.382	0.252	0.184	0.130	0.261
0609B1	33.4	2.826	1.014	0.530	0.320	0.057	0.023	0.008	0.003	0.003	0.011	0.218	0.796	0.483
0609C1	47.1	1.382	0.595	0.377	0.309	0.085	0.023	0.006	0.003	0.003	0.006	0.102	0.311	0.266
0609D1	35.5	1.640	0.949	0.609	0.473	0.127	0.037	0.011	0.005	0.003	0.006	0.071	0.351	0.354
0609ZZ	18.6	1.243	0.541	0.320	0.229	0.057	0.215	0.006	0.003	0.0	0.006	0.082	0.311	0.250

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 134.7
SUM OF SUB-DRAINAGE AREAS = 134.7
TOTAL FLOW IN = 16.30
TOTAL FLOW OUT = 3.12

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0609A1	11	74	0.0	16	0.0				
	1	75	0.0	18	0.0				
	2	75	0.0	2	0.0				
	3	75	0.0	7	0.0	19	0.0		
	5	75	0.181	3	0.0				
	6	75	0.433	8	0.464				
	7	75	0.518	1	0.597				
	8	75	0.422	24	0.422				
	9	75	0.348	21	0.283				
	10	75	0.133	19	0.074				
	12	75	0.0	7	0.0				
0609B1	11	74	0.037	16	0.023				
	12	74	0.068	7	0.048				
	1	75	0.057	18	0.045				
	2	75	1.416	2	0.275				
	3	75	1.841	7	3.115	19	3.398		
	5	75	0.054	3	0.085				
	6	75	0.020	8	0.025				
	7	75	0.011	1	0.014				
	8	75	0.008	24	0.011				
	9	75	0.011	21	0.011				
	10	75	0.031	19	0.017				
0609C1	11	74	0.014	16	0.011				
	12	74	0.042	7	0.020				
	1	75	0.037	18	0.028				
	2	75	0.963	2	0.402				
	3	75	1.161	7	1.501	19	1.501		
	5	75	0.079	3	0.122				
	6	75	0.023	8	0.028				
	7	75	0.014	1	0.020				
	8	75	0.008	24	0.008				
	9	75	0.006	21	0.006				
	10	75	0.017	19	0.011				

TRIBUTARY FLOW INFORMATION FOR CALIFORNIA 04/24/76

LAKE CODE 0609 LAKE HENNESSEY

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
060901	11	74	0.014	16	0.011				
	12	74	0.034	7	0.017				
	1	75	0.034	18	0.028				
	2	75	1.019	2	0.765				
	3	75	0.934	7	1.303	19	0.934		
	5	75	0.074	3	0.110				
	6	75	0.023	8	0.025				
	7	75	0.011	1	0.014				
	8	75	0.006	24	0.006				
	9	75	0.006	21	0.006				
	10	75	0.011	19	0.006				

APPENDIX D

PHYSICAL and CHEMICAL DATA

Reproduced from best available copy.

STORET RETRIEVAL DATE 76/09/24

060901
38 28 53.0 122 22 14.0 3
LAKE HENNESSEY
06055 CALIFORNIA

140392

11EPALES 2111202
0090 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/03/13	14 55	0000	10.9	10.8	24	187	8.40	123	0.050	0.200K	0.180	0.023
	14 55	0005	10.8	10.8		194	8.35	116	0.020K	0.200K	0.050	0.011
	14 55	0015	10.8	10.6		194	8.30	117	0.020K	0.200K	0.040	0.009
	14 55	0025	10.6	10.2		193	8.15	118	0.020	0.200K	0.060	0.012
	14 55	0045	8.7	8.2		194	7.85	126	0.040	0.200K	0.150	0.020
	14 55	0065	8.6	7.6		196	7.80	128	0.050	0.200K	0.150	0.021
	14 55	0086	8.6	7.4		197	7.80	130	0.050	0.200K	0.160	0.021
75/06/26	09 30	0000	20.1	8.2	114	260	8.70	131	0.040	0.300	0.020K	0.005
	09 30	0005	19.9	8.0		260	8.70	132	0.030	0.300	0.020K	0.006
	09 30	0015	19.7	5.0		260	8.20	131	0.020	0.300	0.020K	0.006
	09 30	0023	18.5	3.0		235	7.70	122	0.020	0.300	0.170	0.009
	09 30	0040	10.4	2.0		195	7.60	124	0.020	0.300	0.210	0.014
	09 30	0060	9.9	1.2		220	7.55	121	0.040	0.300	0.270	0.027
	09 30	0083	9.9	1.2		200	7.50	121	0.030	0.300	0.270	0.027
75/11/11	08 35	0000	16.3	8.8	120	255	8.00	134	0.020K	0.200	0.030	0.017
	08 35	0005	16.3	8.4		261	8.00	131	0.020K	0.200	0.020K	0.012
	08 35	0017	16.2	8.0		259	8.00	132	0.020K	0.200	0.020K	0.013
	08 35	0030	16.3	8.2		259	7.80	135	0.020K	0.300	0.020K	0.017
	08 35	0045	14.8	0.4		239	7.60	131	0.180	0.400	0.020K	0.076
	08 35	0076	13.6	0.0		237	7.40	134	0.300	0.600	0.020K	0.146

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060901
38 28 53.0 122 22 14.0 3
LAKE HENNESSEY
06055 CALIFORNIA
140392

11EPALES 2111202
0090 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/03/13	14 55	0000	0.042	6.1	
	14 55	0005	0.034		
	14 55	0015	0.034		
	14 55	0025	0.035		
	14 55	0045	0.039		
	14 55	0065	0.043		
	14 55	0086	0.042		
75/06/26	09 30	0000	0.014	2.6	
	09 30	0005	0.016		
	09 30	0015	0.018		
	09 30	0023	0.020		
	09 30	0040	0.025		
	09 30	0060	0.039		
	09 30	0083	0.046		
75/11/11	08 35	0000	0.025	6.8	
	08 35	0005	0.021		
	08 35	0017	0.023		
	08 35	0030	0.028		
	08 35	0045	0.107		
	08 35	0076	0.370		

STORET RETRIEVAL DATE 76/09/24

060402
38 29 33.0 122 22 33.0 3
LAKE HENNESSEY
06055 CALIFORNIA

140391

11E SALES 2111202
0047 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/03/13	14	00 0000	11.2	11.0	24	188	8.45	117	0.020	0.600	0.040	0.011
	14	00 0005	11.0	11.0		188	8.50	120	0.020	0.400	0.020	0.007
	14	00 0015	10.7	10.0		188	8.00	113	0.020	0.400	0.040	0.010
	14	00 0030	9.4	8.8		188	8.00	116	0.040	0.300	0.120	0.027
	14	00 0043	8.9	8.2		192	7.90	113	0.020	0.600	0.030	0.009
75/06/26	10	05 0000	20.3	8.4	102	260	8.75	136	0.030	0.400	0.040	0.008
	10	05 0005	20.0	8.2		260	8.80	136	0.030	0.500	0.020K	0.004
	10	05 0015	19.7	7.6		260	8.40	134	0.020	0.400	0.020K	0.003
	10	05 0034	11.3	2.0		200	7.75	127	0.020	0.300	0.140	0.005
	10	05 0041	10.4	1.8		200	7.60	124	0.020	0.400	0.210	0.012
75/11/11	09	05 0000	16.2	8.2	132	257	8.15	137	0.020	0.300	0.020K	0.019
	09	05 0005	16.2	8.2		259	8.15	140	0.020K	0.200	0.020K	0.014
	09	05 0018	16.2	8.4		259	8.20	142	0.020K	0.200	0.020K	0.009
	09	05 0036	16.1	8.4		259	8.20	143	0.020K	0.200	0.020K	0.018

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/03/13	14	00 0000	0.047	3.0	
	14	00 0005	0.041		
	14	00 0015	0.038		
	14	00 0030	0.041		
	14	00 0043	0.042		
75/06/26	10	05 0000	0.020	3.1	
	10	05 0005	0.018		
	10	05 0015	0.021		
	10	05 0034	0.015		
	10	05 0041	0.029		
75/11/11	09	05 0000	0.026	4.6	
	09	05 0005	0.022		
	09	05 0018	0.021		
	09	05 0036	0.020		

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060903
38 27 25.0 122 21 00.0 3
LAKE HENNESSEY
06055 CALIFORNIA

140392

11EPALES 2111202
0032 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/06/26	10 40	0000	20.9	7.6	48	275	8.55	141	0.030	0.400	0.030	0.003
	10 40	0005	20.1	7.8		270	8.60	139	0.020	0.400	0.020K	0.005
	10 40	0015	19.7	5.0		260	7.90	138	0.020	0.300	0.020	0.005
	10 40	0028	16.4	3.6		235	8.70	138	0.020	0.300	0.020	0.004
75/11/11	09 30	0000	16.0	8.4	108	261	8.10	147	0.020K	0.200	0.020K	0.015
	09 30	0005	16.0	8.2		263	8.10	147	0.020	0.300	0.020K	0.016
	09 30	0020	15.9	8.6		263	8.10	147		0.200	0.020K	0.012
	09 30	0027	15.6	8.4		265	8.10	145		0.200	0.020K	0.012

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/06/26	10 40	0000	0.027	4.1	
	10 40	0005	0.033		
	10 40	0015	0.023		
	10 40	0028	0.032		
75/11/11	09 30	0000	0.024	5.9	
	09 30	0005	0.025		
	09 30	0020	0.029		
	09 30	0027	0.022		

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY DATA

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STORET RETRIEVAL DATE 76/09/24

NAPA
38 2- 55.0 122 22 25.0 4
NAPA PIPELINE
06 7.5 YOUNTVILLE
O/HENNESSEY RESERVOIR 140342
CHLORINATION FACILITY AT CONN DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	13 10		0.104	0.300	0.075	0.030	0.040
74/12/07	10 30		0.256	1.900	0.032	0.065	0.090
75/01/18	14 00		0.144	0.200	0.010	0.050	0.070
75/02/07	10 45		0.168	1.400	0.016	0.050	0.060
75/03/07	11 45		0.184	2.000	0.016	0.048	0.060
75/03/19	10 30		0.141	1.750	0.018	0.064	0.080
75/05/03	14 30		0.270	0.250	0.010	0.055	0.080
75/06/04	11 00		0.09[illegible]	1.450	0.035	0.025	0.200
75/07/01	15 48		0.070	1.100	0.015	0.065	0.200
75/08/24	14 40		0.016	0.600	0.025	0.070	0.580
75/09/21	13 00		0.025	0.300	0.005	0.045	0.460
75/10/14	14 45		0.010	0.100	0.015	0.050	0.580

STORET RETRIEVAL DATE 76/09/24

06 091
38 30 15.0 122 23 32.0 4
CONN CHEES
06 7.5 ST HELENA
T/RESSET RESERVOIR 140342
CONN ALT RD BRDG AT NW TIP OF LAKE
11E-ALES 211120
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/18	11	00	0.010	0.700	0.050	0.105	0.130
74/12/07	13	10	0.240	1.600	0.050	0.120	0.130
75/01/18	10	45	0.200	0.100K	0.035	0.100	0.100
75/02/02	14	00	0.640	4.000	0.240	0.380	0.440
75/03/07	09	45	0.200	3.300	0.090	0.200	0.600
75/03/19	10	10	0.340	1.300	0.050	0.089	0.220
75/05/03	12	00	0.010	0.650	0.020	0.025	0.040
75/06/04	12	00	0.320	0.250	0.015	0.065	0.120
75/07/01	12	00	0.005	1.100	0.010	0.025	0.050
75/08/24	10	25	0.015	0.300	0.050	0.135	0.140
75/09/21	09	00	0.010	0.300	0.015	0.130	0.140
75/10/19	10	25	0.035	0.100	0.030	0.125	0.150

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

06041
38 30 29.0 122 21 10.0 4
CHILES CREEK
06 7.5 CHILES VLY
TRIBUTARY TO RESERVOIR 1+0992
DNR OFF C&P VLY RD 1.2 M N HWY 128 JCT
NAPA 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/18	11 45		0.032	1.000	0.040	0.025	0.025
74/12/07	12 30		0.200	1.300	0.020	0.030	0.040
75/01/18	11 30		0.160	0.900	0.010	0.025	0.070
75/02/02	12 40		0.240	1.100	0.016	0.035	0.070
75/03/07	10 25		0.352	2.000	0.032	0.040	0.090
75/03/19	11 45		0.348	2.000	0.025	0.024	0.040
75/05/03	15 30		0.440	0.150	0.015	0.015	0.050
75/06/04	13 30		0.530	0.100	0.030	0.030	0.030
75/07/01	12 40		0.345	0.400	0.005	0.020	0.020
75/08/24	13 25		0.230	0.150	0.015	0.030	0.030
75/09/21	10 15		0.070	1.600	0.020	0.032	0.040
75/10/19	14 30		0.070	0.700	0.020	0.025	0.040

STORET RETRIEVAL DATE 76/09/24

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 060401
38 29 30.0 122 20 05.0 4
CLEAR CREEK
06       7.5 YOUNTVILLE
T/HENNESSEY RESERVOIR     140342
UNPAVD RD XING JUST OFF HWY 128
11EPALES                  211120
 0000 FEET  DEPTH  CLASS 00
```

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	12 45		0.016	1.000	0.030	0.025	0.030
74/12/07	11 25		0.012	1.600	0.025	0.020	0.030
75/01/18	13 00		0.008	1.000	0.005	0.015	0.030
75/02/02	11 10		0.870	1.200	0.016	0.035	0.100
75/03/07	11 30		0.280	3.200	0.024	0.032	0.070
75/03/19	13 00		0.165	0.750	0.015	0.018	0.040
75/05/03	15 10		0.010	0.175	0.015	0.005	0.040
75/06/08	15 00		0.005	0.800	0.045	0.025	0.050
75/07/01	14 20		0.040	0.700	0.005	0.025	0.040
75/08/24	12 15		0.240	1.000	0.030	0.036	0.036
75/09/21	12 30		0.015	0.400	0.005	0.035	0.070
75/10/19	11 30		0.005	0.600	0.010	0.030	0.040

STORET RETRIEVAL DATE 76/09/24

060761
38 29 05.0 122 22 50.0 4
SPILLWAY DITCH
06 7.5 RUTHERFORD
T/HE[illegible]ESSEY RESERVOIR 140391
SPILLWAY 1 MI W OF CONN DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
75/03/07	10 15		0.056	1.900	0.016	0.016	0.030
75/03/19	11 00		0.046	1.500	0.018	0.015	0.030
75/05/03	15 30		0.010	0.400	0.010	0.005	0.060

STORET RETRIEVAL DATE 76/09/24

060771
38 32 15.0 122 20 10.0 4
UNNAMED CREEK
06 7.5 CHILES VLY
T/HENNESSEY RESERVOIR 140992
C&P VLY RD 1ING .1 M N CHILES GRIST MILL
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	12 10		0.288	0.600	0.020	0.020	0.030
74/12/07	12 05		0.320	1.050	0.020	0.030	0.045
75/01/18	12 00		0.800	0.800	0.005K	0.020	0.020
75/02/02	11 45		0.595	1.200	0.012	0.055	0.100
75/03/07	10 45		0.440	2.200	0.024	0.032	0.090
75/03/19	12 00		0.551	0.450	0.020	0.024	0.040
75/05/03	15 00		1.570	0.050	0.015	0.015	0.050
75/06/08	13 45		1.570	0.575	0.060	0.060	0.085
75/07/01	13 30		1.800	1.150	0.012	0.025	0.050
75/08/24	11 40		0.250	0.525	0.035	0.035	0.035
75/09/21	11 30		0.430	0.600	0.015	0.045	0.050
75/10/19			0.290	0.900	0.015	0.030	0.050

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060401
38 32 10.0 122 20 10.0 4
CHILES CREEK
06 7.5 CHILES VLY
T/HENNESSEY RESERVOIR 140992
C&P VLY RD XING AT JCT W LNK CHLS VLY RD
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	12 15		0.416	0.700	0.020	0.025	0.025
74/12/07	12 17		0.400	0.900	0.015	0.025	0.030
75/01/18	12 00		0.704	0.250	0.005K		0.022
75/02/02	11 55		0.510	0.700	0.008K	0.055	0.140
75/03/07	10 55		0.352	2.300	0.038	0.048	0.110
75/03/19	12 00		0.515	0.750	0.020	0.015	0.050
75/05/03	15 20		1.400	0.300	0.015	0.015	0.050
75/06/08	14 00		1.250	0.700	0.035	0.025	0.030
75/07/01	14 00		1.500	1.150	0.010	0.025	0.030
75/08/24	11 55		0.240	0.100	0.020	0.030	0.030
75/09/21	11 45		0.500	1.400	0.020	0.035	0.035
75/10/19	14 15		0.400	0.300	0.010	0.030	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/09/24

060451
38 30 15.0 122 17 45.0 4
SAGE CREEK
06 7.5 CHILES VLY
T/HENNESSEY RESERVOIR 140992
HWY 128 XING NEAR LWR CHLS VLY RD JCT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/11/16	12 30		0.064	0.400	0.045	0.050	0.060
74/12/07	11 40		0.112	1.300	0.025	0.055	0.080
75/01/18	12 30		0.740	0.100	0.005K	0.030	0.043
75/02/02	11 30		2.880	1.500	0.024	0.065	0.170
75/03/07	11 15		0.336	1.500	0.024	0.056	0.100
75/03/19	12 35		0.426	0.850	0.020	0.022	0.050
75/05/03	16 00		0.890	0.200	0.015	0.030	0.060
75/06/08	14 15		2.100	0.400	0.015	0.060	0.110
75/07/01	14 20		2.400	0.350	0.005	0.055	0.060
75/09/21	12 00		1.050	0.800	0.010	0.050	0.060
75/10/19	11 30		0.690	0.700	0.015	0.055	0.110

K VALUE KNOWN TO BE
LESS THAN INDICATED